CANADIAN ARCHITECT AND BUILDER.

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—THE—

CANADIAN ARCHITECT AND BUILDER,

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(With a Weekly Intermediate Edition—The CANADIAN CONTRACT RECORD),

PUBLISHED ON THE THIRD THURSDAY IN EACH MONTH IN THE INTEREST OF

ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

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ADVERTISEMENTS.

Prices for advertising sent promptly on application. Orders for advertising should reach the office of publication not later than the 12th day of the month, and changes of advertisements not later than the 5th day of the month.

EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The "Canadian Architect and Builder" is the official paper of the Architectural Associations of Ontario and Quebec.

Subscribers who may change their address should give prompt notice of same. In doing so, give both old and new address. Notify the publisher of any irregularity in delivery of paper.

MONS. H. LE CHATELIER, a French scientist, has recently succeeded in producing marble from pure calcined carbonate, This substance in the form of an impalpable powder, was enclosed in a steel cylinder and compressed between two steel pistons with a pressure of 1,000 kilogrammes per square centimeter. While in this condition, a platinum spiral previously embedded in the powder, was heated by an electric current, with the result that the powder in the neighborhood of the wire was rendered crystalline and translucent. Sections of the resulting substance when examined under the microscope exhibited the characteristics of certain specimens of slightly marled marble. This achievment though it may be useless from an economic point of view is none the less interesting.

THE storm which a few weeks ago passed over Ontario, and was the cause of great destruction of property, may be taken as an illustration of the fact previously adverted to that provision should be made by architects and builders in the erection of their buildings to resist the increased wind pressures to which apparently buildings in this country are likely to be subjected in the future. In the storm to which we have referred, the spire of a Toronto church was carried away, and the vibration of some of the buildings used for business purposes was so great as to cause serious alarm to the persons employed therein. There seems to have come a change in the climatic conditions of this country of which more violent wind storms are a feature, and their influence upon buildings should not be lost sight of by those who design them.

THE subject of the water supply of the city of Toronto has been one of general interest for many years past, more particularly during the last two years, within which a number of accidents have occurred to the waterworks plant, resulting in deterioration of the quality of the supply. The question as to what should be done to improve the supply and perfect the system, has been widely discussed, and numerous have been the theories advanced. The idea that water of much greater purity is obtainable at Lake Simcoe, and that it could be conveyed by gravitation to Toronto more cheaply than the necessary supply could be pumped from Lake Ontario by the existing method, is one which has apparently taken a firm hold on the minds of some of the citizens. The advocates of this idea argue that not only could water for drinking and other domestic purposes be supplied, of better quality and more cheaply, by this method, but also that power could be developed to operate all the manufacturing establishments of the city, as well as light the streets. These views were promulgated by one of the mayoralty candidates at the last municipal election. Whether or not the startling nature of the proposal had anything to do with his defeat, we have no means of knowing ; certain it is, however, that the theory is not backed up by any engineering authority. The fact has been demonstrated that the water of Lake Simcoe is in no respect superior in quality to that of Lake Ontario. This is one of the important features in the case. Another is, that in the opinion of the City Engineer of Toronto, a tunnel can be constructed for half a million dollars which will ensure a supply of water sufficient for the needs of half a million people, while the means of bringing water from Lake Simcoe would cost millions. The height of land lying between Lake Simcoe and Toronto, would necessitate about twelve miles of tunnelling, the cost of which in itself would be enormous. As to the advantage of the scheme for power purposes, it is an undisputable fact that power can be produced cheaper by steam engines on the ground.

SIR David Macpherson in presenting his collection of palms and plants to the city of Toronto made, in referring to the Palm Garden of Frankfort on the Main, a suggestion as to the manner of housing them. A prominent merchant of the city, who has spent some months near Frankfort, has written to the *Mail* describing the Palm Garden in terms of enthusiasm and advocating the erection on the same model of a winter garden in Toronto. Sir David Macpherson's collection is evidently the nucleus of what may be made a very good thing. But it is well, in adopting ideas from successful features of European cities, to remember that such features can seldom be transplanted without modification. Continental modes of life are so different from ours that in appropriating ideas we must start from consideration of our own needs as carefully as in originating without a model; and it will usually be found, where the resulting work is good, that what was at first taken as an example has ended by being only a suggestion.

LORD ABERDEEN'S request for an addition to Rideau Hall has excited comments from the daily press varying according to the political bias of the paper. One paper is for leaving Rideau Hall as it is and forcing our Governor-Generals to conform their manner of living to the ideas of our farmers who, the leader writer asserts, are coming to the front in public affairs and will be found on the side of a policy of "democratic simplicity." Another paper is for pulling down Rideau Hall and replacing it by a "respectable looking mansion." It is, as it has turned out, a pity that this course was not adopted at first, for, according to the figures quoted, Rideau Hall, which cost $82,000 to purchase, has cost $53,000 for repairs and alterations. Whether the need of fifteen thousand dollars worth of more room is sufficient provocation to pull down what has been done and build the respectable looking mansion now, is a question. It would not be an exact response to the request of the Earl, who has not asked for a new mansion bye and bye, but for a few more rooms now. It hardly seems likely that the old Hall with its additions will be pulled down before it has had a life reasonably proportioned to the money which has been spent upon it. When the time does come for it to be replaced it is to be hoped that some steps will be taken to have the work well designed. It is not the class of building that is likely to be well handled by the Public Works Department. The forte of the Chief Architect's office is in its organization for the multiplication of buildings of a similar class An order for such an unprecedented and (unless the farmer forbids) elaborate piece of work as a new residence for the Governor-General would sweep the office like a cyclone. The pavilion representing Canada at the World's Fair has already proved too much for the elasticity of the departmental designer. If a new residence for the Governor-General should get into the hands which produced that work, it is impossible to avoid the conviction that however capacious the mansion might be it would not be "respectable looking."

THE by-law appointed by the City Council of Toronto some four years ago, making compulsory the inspection by the city officials of all plumbing and drainage work, as well as alterations in existing work done in the municipality, is unquestionably one of the most valuable pieces of civic legislation that has marked the history of the city. Previous to the passing of this by-law, the plumbing and drainage work throughout the city, even in the most expensive residences, was often done in a disgraceful manner, and in such a way as to prove injurious to the health of the occupants of the house. It was not unusual for drains to be laid without joints of any kind being made and in this condition covered up with earth and concrete, the character of the work being subsequently revealed when sickness entered the house. Under the present system, work of this kind is no longer possible; the owner or his architect can demand from those who are to do the work a certificate from the plumbing inspection department that everything has been done in accordance with the provisions of the plumbing by-law, and unless the work has been done in this manner, the department will not issue a certificate, and the owner may refuse payment. Another valuable feature of the by-law is, that plans for the plumbing and drainage work must be filed with the plumbing department, so that in the event of defects developing in the work in the future, the exact location the of pipes is ascertainable. A great deal of difficulty is often experienced in cases where alterations are required to work done previous to the passing of the by-law, as in such cases much trouble and expense is often necessary to discover the location of the drains. In this connection we wish to point out that greater care should be exercised in the plumbing department for the protection of the plans which are there filled, and the value of which we have already referred to. These plans are at present kept in pigeon holes in an ordinary wooden desk, where, should a fire occur, they would be certain to be destroyed. The plumbing department should lose no time in providing a fire proof receptacle for these plans, otherwise we may expect to hear that the valuable record of plumbing work done in the city for several years past has been irrertievably lost.

IN view of the hundreds of thousands of dollars that have been bequeathed to the engineering department of McGill University, it is a matter of wonder that not a dollar has been given for architectural education. Mr. Baillargé, in his paper read before the Province of Quebec Association of Architects, very truly says that there is a greater need in Canada to-day for instruction in architecture than in engineering. In engineering knowledge and ability Canada already takes front rank, and it is no doubt, partly due to the facilities which have been afforded for obtaining engineering knowledge. This knowledge is undoubedtly important, but cannot be said to be more so than a knowledge of architecture. Architecture, especially in the odern days in which we live, affects so closely the life andm happiness of the individual, that its importance cannot easily be overestimated, and in view of this, it is surprising that greater interest has not been manifested by the public in the proper education of architects. The range of knowledge required by the architect of to-day, is greater than that required by the engineer. He should to a large extent have the knowledge of the engineer, and in addition be conversant with the principles of sanitation, design, decoration, etc., of which the engineer needs to know nothing. On the knowledge of our architects depends the appearance of our towns and cities, as well as the comfort and health of the citizens, and a sense of pride, if nothing more should cause our people to assist in every way possible the cause of architectural education. While possibly little can be done for the architects of the present, steps should be taken to place within the reach of Canadian students of architecture in the future the means of acquiring the needed instruction pertaining to the successful practice of the profession. We trust that the Architectural Associations of Ontario and Quebec will continue to keep this subject before public notice, and that in the near future some of our wealthy citizens will feel it a privilege to give liberally for this worthy object. Unfortunately, architects themselves as a rule are not possessed of sufficient wealth to give much assistance to this object; were it otherwise, we have no doubt that facilities for the study of architecture would long ago have been provided.

OLD UPPER CANADA COLLEGE GROUNDS.

THE Parks and Gardens Committee of the Toronto City Council is considering a message from the Mayor proposing that the city should acquire the old Upper Canada College grounds "for park and other purposes." The price is the present assessed value of the land. The terms are so easy as to suggest the possibility of securing an open space and ornamental feature for the city with but little burden to ratepayers. It is possible so to lay out the land as to make building sites aggregating in value about the purchase price of the block, and still leave vacant enough land for ornamental open space. To do this will be a benefit to the city greater than the acquisition of the land for park purposes only. A park is after all an interruption in a city, while a square is a higher development of the city itself; and what is needed just now in that part of the city is development. Moreover, the removal of Government House, after some time, is probable; and its grounds are better fitted for park purposes than the grounds of Upper Canada College. They are better adapted to the purpose in form, but particularly by their southerly position. It is the southerly aspect that buildings require, and the Upper Canada College grounds with Government House to the south are a more eligible site for building upon than are the Government House grounds with a park on the Upper Canada College grounds to the north

Although it is possible to balance the cost of the whole block by the price of a portion only, laid out for building upon, it is of course impossible in the present state of affairs to do this at once, and so give the city an open space for nothing. Whether or not this may be the ultimate result is a question chiefly of population. But it is also a question of management. The value of the ground to the city, both as an attractive feature and also as a financial investment, depends to an extent that it would be hard to overestimate upon the skill and judgment with which it is laid out. It is a case for an expert adviser whose fee would be returned many times in increased availability of the land and its enhanced value. The better the opportunity given for profitable investment of capital, the greater is likely to be the response and—which is important—the quicker. There have been for some time rumors in the air of a big hotel, connected with the names not of one set of promoters only but of several. That the lack of such a hotel is a loss to the city is now common opinion. The Upper Canada College grounds have been often talked of as a suitable site. They are near—and yet not too near—the water, the Union Station, and the business part of the city. A site inside the grounds would give the hotel retirement from the streets combined with a southerly aspect and an outlook over the Government House grounds, which may some day form an even more pleasing prospect. If, by municipal intervention to treat the whole square, immediate surroundings which are agreeable can be secured for the hotel without involving an extensive purchase of land by its stockholders, it is likely that the scheme would at last hatch out and the big hotel form not only a speedy and large contributor to the cost of purchasing the block, but an attraction to other purchasers and a standard of character for the buildings, which would increase the revenue to be derived from the land and also raise the value of neighboring property.

TORONTO TECHNICAL SCHOOL.

LATE in the fall of 1891 the City Council passed a by-law establishing the Toronto Technical School, providing the means and appointing a Board, giving them full powers to obtain a building and equipment, to select a staff of teachers and to draw up a scheme whereby might be placed within the reach of mechanics and artisans and the employed of the city generally, the means of acquiring those elements of an education which would be of most value to them in the pursuit of their various avocations.

The preliminaries were attended to by the Board, but it was well on in January before the school could be opened. They had succeeded in securing for temporary use the building formerly occupied as Wycliffe College, on the north side of College street at the head of McCaul. It needed some refitting. From the start the school was well attended. The work of the first term was naturally to a great extent experimental, though by considering the special needs of the students and comparing the work done at various similar schools abroad, a programme was followed out which has not had to be materially altered excepting in the way of enlarging upon it and co-ordinating more thoroughly the different parts. This term extended to the first of May. Classes met five nights a week between eight and ten o'clock each night.

In October, 1892, the school re-opened, and again with a good attendance. This was expected to be the trying year. It was thought that the novelty of the appearance of this institution in Toronto might account for the good attendance during the opening term. If it tided over this year it would indicate that such a school could be of use. The register went up during the year to over three hundred and thirty, more than realizing the hopes of its most sanguine supporters. The school continued to thrive, though in cramped quarters, and with temporarily equipped class rooms. The students meant business, they came to learn; and the teaching staff worked with a will. The results were most satisfactory.

Again at the beginning of last month the school re-opened. The classes were crowded from the very start. As compared with a similar period last year the attendance this year has been multiplied by four. In the first week last year somewhat over 100 were registered; in the first week this year four hundred and fifty, and at the end of the second week five hundred and fifty were registered.

It is no longer a question whether there is room for such a school in Toronto. The experimental stage is past. It has come to stay. It is now for the city to show its appreciation of the value of such a school for the education of its mechanics and artisans by assisting it in its development, by providing it with more commodious quarters, and when necessary, by increase of staff or equipment. The sooner it is provided with better accommodations the better will be the results accomplished. It is now in a building greatly inadequate for the purpose. Why should not steps be taken at once to acquire for it better and permanent quarters? As long as it is cramped for room, and unable to separate the different grades and classes of work in the draughting room, as long as some of the elementary classes are three or four times their proper size, as long as chemistry, hydrostatics, light, heat, sound, electricity and electrical testing and laboratory work wait their turn in one small room, so long will the school be unable to accomplish the work that is evidently cut out for it in this city.

The ground at present covered by the course is comprised under the following heads: Mathematics (including arithmeti algebra, Euclid and trigonometry); Draughting (including prac tical, mechanical, architectural and geometrical drawing and copying, as well as classes in practical geometry, orthographic and oblique projection, perspective, etc.); Mechanics (including statics, kinematics and dynamics), Physics (including hydrostatics, heat, sound, light and electricity and magnetism); and chemistry (inorganic). There are two classes, a junior and a senior, in algebra, Euclid, mechanics, draughting and descriptive geometry, electricity and chemistry.

The students in chemistry also have the opportunity of doing practical work in a chemical laboratory which has lately been fitted up for the purpose.

While the course as outlined is as extensive as can be expected under the present conditions, there are still channels along which it might be still further developed—even while keeping along the same general lines—which would be of great benefit to a considerable number of students. Some of these extensions have already been proposed, but cannot be carried out for lack of accommodations. Classes in decorative design, freehand drawing, etc., have often been asked for. There are a number of subjects that would be of value to engineers and mechanics, such as the working principles of the steam engine, the testing of materials for strength, etc., foundry and machine shop principles, etc., etc. Other extensions would suggest themselves if the school were allowed to develop freely.

The Toronto Technical School has started well, and we hope to see it continue to prosper. We are satisfied that the city which has generously supplied it during its earlier days when its existence was an experiment, will not now allow it to stop short of its full possibilities.

ILLUSTRATIONS.

RESIDENCE EOR C. W. LEONARD, QUEEN'S AVENUE, LONDON, ONT.—MOORE & HENRY, ARCHITECTS.

This building consists of basement, two main floors, and finished attic, and is built facing the south. The foundation is of Credit Valley brown stone, and the upper walls of red pressed bricks and red sandstone.

The interior is finished in various hardwoods, heated by hot water and lighted by gas and electricity; cost $12,000.

ENTRANCE TO FREEHOLD LOAN BUILDING, TORONTO.—E. J LENNOX, ARCHITECT.—HOLBROOK & MOLLINGTON, SCULPTORS.

WESTMINSTER PRESBYTERIAN CHURCH, TORONTO.—GREGG & GREGG, ARCHITECTS.

QUESTIONS AND ANSWERS.

[Readers are invited to ask through this department for any information which they may require on line consistent with the objects of the paper. Every effort will be made to furnish satisfactory answers to all such inquiries. Readers are requested to supply information which would assist us in our replies. The names and addresses of correspondents must accompany their communications, but not necessarily for publication.]

E. A., Toronto, writes: Through the columns of your valuable paper would you please tell me what extra training would a person holding a School of Practical Science Diploma of Architecture require to become an architect?

ANSWER.—We presume that by "an architect" E. A. means a member of the Ontario Association of Architects. A graduate of the School of Practical Science can become a member of the Association by serving under articles of apprenticeship, in the office of a member of the Association for three years (of which one year may have been served during the vacation of the School) and by passing the examinations of the Associations.

SPURIOUS HARDWARE.

SOME of the leading hardware merchants of Toronto complain that duplicates of some of the more favored and expensive patterns in American hardware are being manufactured in cast iron in Toronto, and after being plated are placed on the Canadian market, represented to be the genuine article. At first appearance the spurious goods are a good copy of the genuine and can be detected only by very careful examination. To make detection still more difficult, a genuine lock is often used with a counterfeit escutcheon. A close inspection will usually reveal that the counterfeit article, while perhaps identical in color, is slightly smaller in size than the genuine. This is due to shrinkage in casting, in the process of which one of the genuine articles is used as a pattern. The genuine article is made of bronze metal, which to a considerable extent is impervious to the action of the atmosphere. The imitation is as we have said made of cast iron, and will retain its appearance at the longest only a few months. The importers of expensive American hardware claim that they should not be placed in competition with a spurious article which can be produced at a tithe of the cost of the genuine. If architects are satisfied with cheap goods they are quite willing to compete on that line, but they should not be excepted to place a genuine article in competition with one to which the same name and appearance have been given, but which is counterfeit. Architects would do well te enquire into this matter.

THE RE-INFORCEMENT OF CONCRETE BEAMS BY TWISTED IRON FOR FIRE-PROOF FLOORS.

The reference made in the May number of the *California Architect* to the use of twisted iron incorporated in concrete, has called out some inquiries, says that journal, as to the nature and extent of the tests so far applied to this mode of construction. Though first introduced upon this coast but little has been published here respecting this new departure in fire-proof biulding.

The Museum at the Standard University was not the first structure where this method was employed, but the concrete beams supporting the heavy dome, have the longest span yet produced, forty-five feet. Another notable example is the California Academy of Sciences on Market street, where five floors covering an area of 50,000 square feet are so constructed. The span ranges as high as thirty feet, and there is also a projection of three feet of concrete over the central area, supporting an iron railing at the outer edge, and walk for visitors. The floors were estimated to carry with safety 250 pounds per square foot. One section, 15x22, was tested with a uniform load of 415 pounds per square feet, and the load was left on one month. The architects reported the extreme deflection at the center as only one-eighth of an inch. Contractors and workmen were distrustful at first, but their confidence became unbounded before the completion of the work. The saving over the usual mode is estimated at fifty cents per square foot.

Touching the weight of these floors, as compared with iron girders and hollow tiles, the first impression that the concrete must necessarily be much heavier, is found incorrect. For when the span is of usual length, and the required strength of moderate limit, the weight per square foot is less with the new construction. For example : with spans of fifteen to twenty feet, and a safe load of seventy-five pounds per square foot, the saving in weight is about forty per cent over iron girders and hollow tiles. With a load of 129 pounds it is some twenty per cent.

This economy is doubtless due to the fact that the bond between the twisting iron and the enveloping concrete is so perfect and continuous as to give the effect of a homogeneous beam, and that the tensile strength of the iron bar is utilized.

Ordinarily in the use of iron with concrete, the strain has been concentrated at a single point by the employment of nuts and washers. By twisting the iron before it is imbedded in the concrete the strain is diffused equally through the length of the bar while it is firmly held at all points by the enveloping mass.

An incidental advantage of the twisting is that thereby all imperfectly laminated iron is at once detected, and the defect exposed, ensuring the employment in practical use of only a high quality of iron.

In the more common forms of construction the major element has been the iron beam, whose lower cord was exposed, necessitating additional protection below against the action of heat. By substituting the concrete beam as the chief factor, the iron used is so incorporated within the body of the stone as to be amply protected without extra cost. Moreover the iron girder is an expensive form, while the very simplest or cheapest is the flat or square bar.

The claim that cold twisting actually adds to the strength of the bar, rests upon somewhat exhaustive experiments conducted by Lieutenant F. P. Gilmore, U. S. N. (Government Inspector of Iron and Steel for war vessels under construction at San Francisco) and by the College of Mechanics of the University of California at Berkely, also at the celebrated Low Moor Iron Works, England.

Lieutenant Gilmore found that common commercial iron ¼ inch square, being given 1½ twists per lineal foot gained seventeen per cent. in tensile strength ; given 3¾ twists, twenty per cent., and six twists gained twenty-four per cent.

The best Norway Iron given six twists per foot, gained from fifty to fifty-three per cent in tensile strength.

Similar experiments at the Low Moor Iron Works ¾ inch round iron, showed twenty-two per cent gain for 1½ twists per foot ; thirty-six per cent. with 2½, and forty-one with three twists, which were as far as the experiments noted were carried.

The latter experiments conducted by the University of California gave similar results, with one important fact ascertained, namely : that a suitable interval between the twisting and the testing gave a much greater gain. Three-quarter inch iron turned down to ⅝ was given six twists per lineal foot. Twisted while hot there was a small loss in tensile strength. Twisted cold and tested immediately, the gain ranged from twenty-three to forty-three per cent. Twisted cold and allowed to remain five days and then tested, the increase in tensile strength of the same quality of iron was from forty-seven to fifty-nine per cent. or an average of fifty-three per cent.

It would seem that advantage might be taken of this important augmentation of tensile strength in many places. Bridge builders, as well as workers in concrete, would do well to inform themselves fully upon this claim.

"CANADIAN ARCHITECT AND BUILDER" COMPETITION.

The publisher of the CANADIAN ARCHITECT AND BUILDER invites competitive designs for a town house and stable to cost not more than $4,500.

The house is to be placed on the east side of the street. The lot is 35 feet wide and 125 feet deep. The houses on either side are built up to within three feet of the dividing line, and are fifteen feet from the street line.

The stable should provide accommodation for one horse and accoutrements, and vehicles for summer and winter use. Access to the stable can only be had from the front of the lot.

The house is to be heated with hot water. Arrangement of piping, location of radiators, etc., should be indicated.

Good planning from the standpoint of health, convenience and comfort, will be given first consideration in judging the designs.

Each competitor must give a concise description of his design, stating the materials proposed to be used in its construction.

Drawings must include two principal elevations, floor plans and detail of hall and stair. A perspective may be submitted at the option of the competitor.

The first premium will be $15.00 ; the second $5.00 ; the third, one year's subscription to the CANADIAN ARCHITECT AND BUILDER.

Drawings must be made on sheets of heavy white paper or bristol board 14 x 20 inches in size, and must be drawn sufficiently coarse to allow of their being reduced to one-half the above size. Drawings must be made in *firm strong lines*, with *pen* and *black ink*. *No color or brush work will be allowed.* Each drawing must be marked with the *nom de plume* of its author, and the author's name, *nom de plume* and full address, enclosed in a sealed envelope, must accompany each drawing sent in.

Drawings must reach the office of the CANADIAN ARCHITECT AND BUILDER, 107 Confederation Life Building, Toronto, not later than the 2nd day of January, 1894.

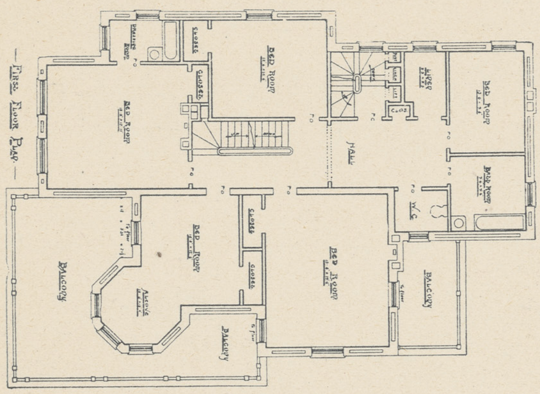
The right is reserved of publishing any design sent in. All designs will be returned to their authors within a reasonable time after the competition is decided.

The decision as to the respective merits of the designs submitted will be made by a committee appointed by the Architectural Guild of Toronto.

All architects practising in cities are debarred from this competition.

WESTMINSTER PRESBYTERIAN CHURCH, TORONTO.

GREGG & GREGG, ARCHITECTS.

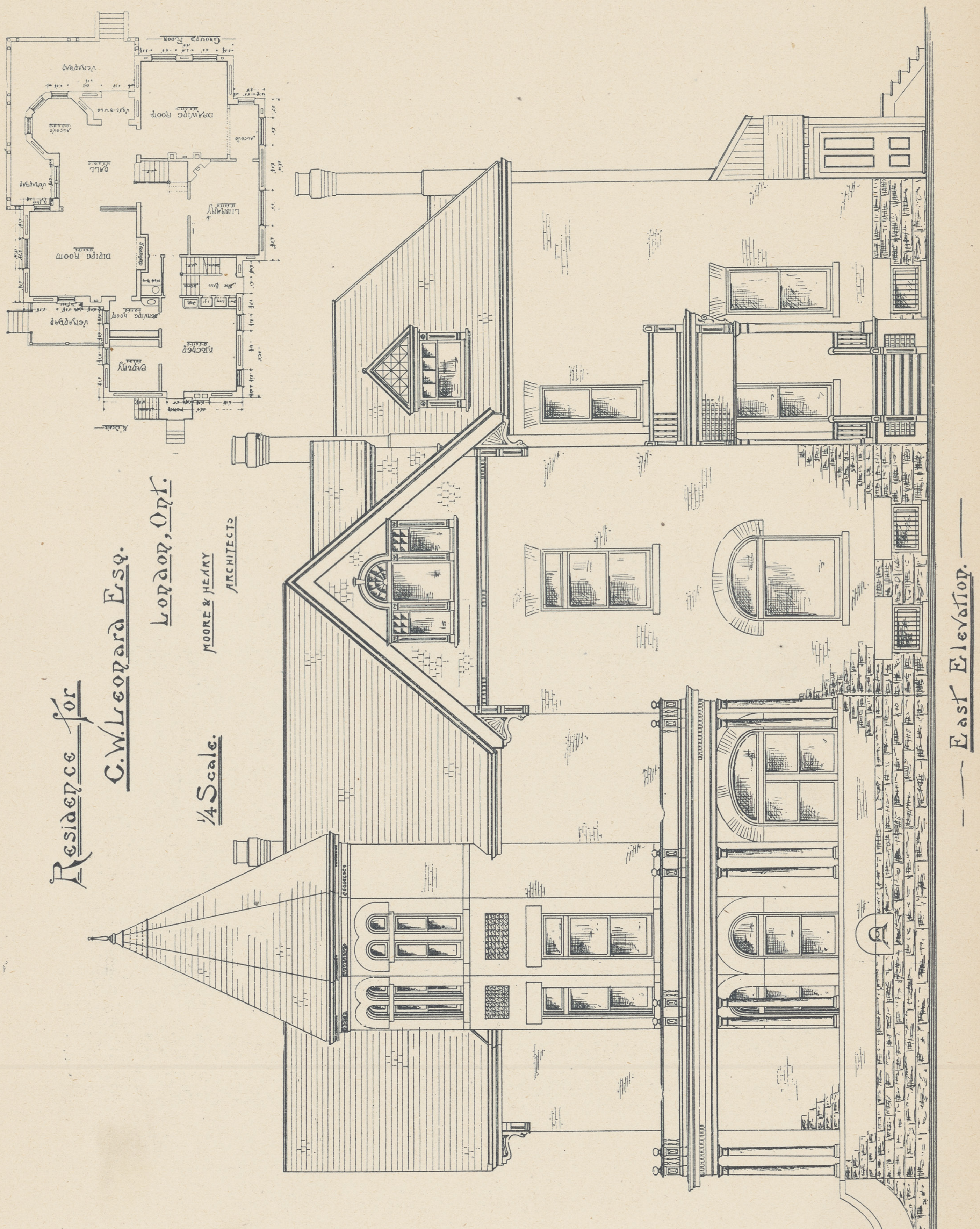


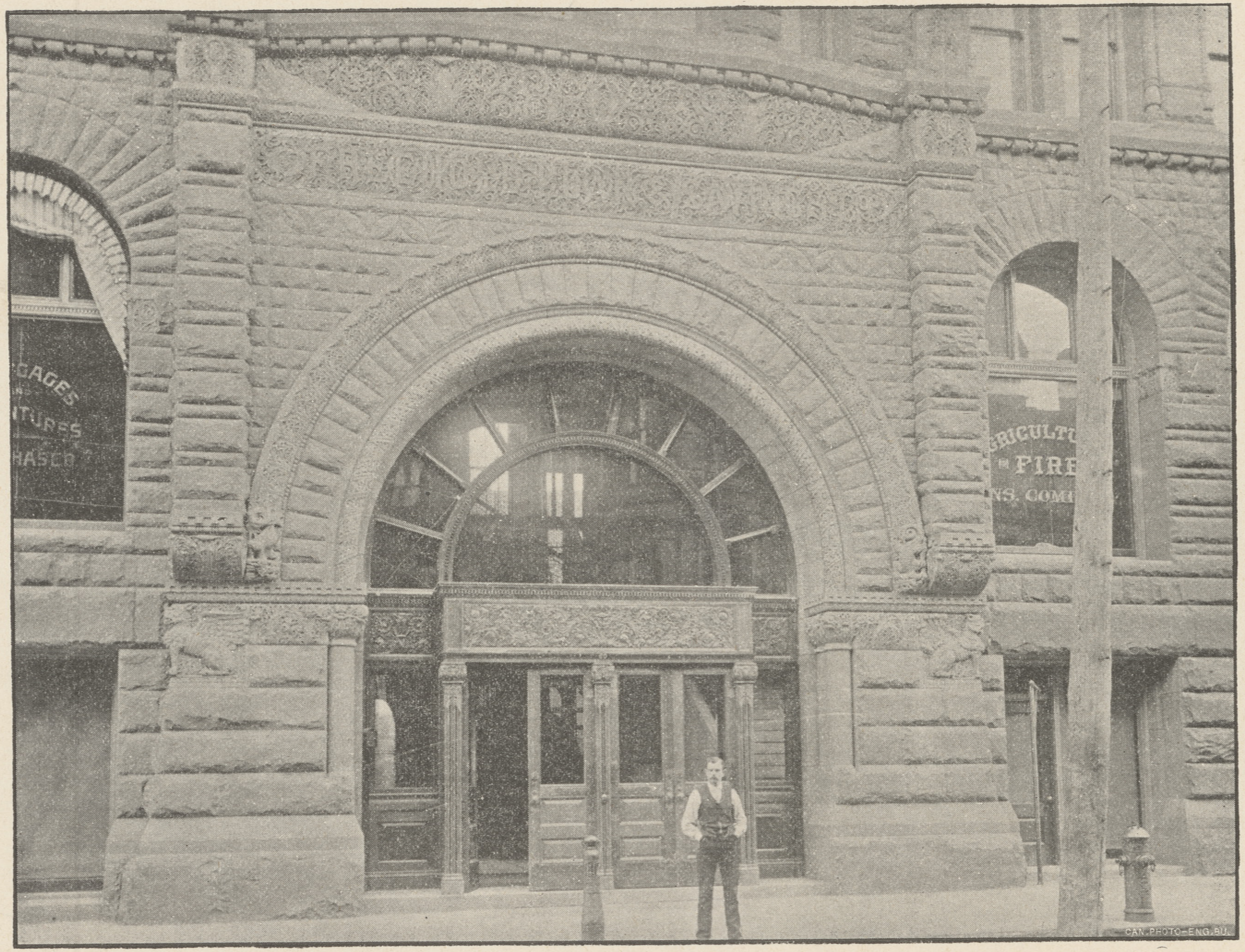
Residence for C.W. Leonard Esq. London Ont.

MOORE & HENRY
ARCHITECTS

1/4 Scale

Front Elevation


Residence for
C.W. Leonard Esq.
London, Ont.
1/4 Scale.
MOORE & HENRY
ARCHITECTS
East Elevation.



ENTRANCE TO FREEHOLD LOAN BUILDING, TORONTO.

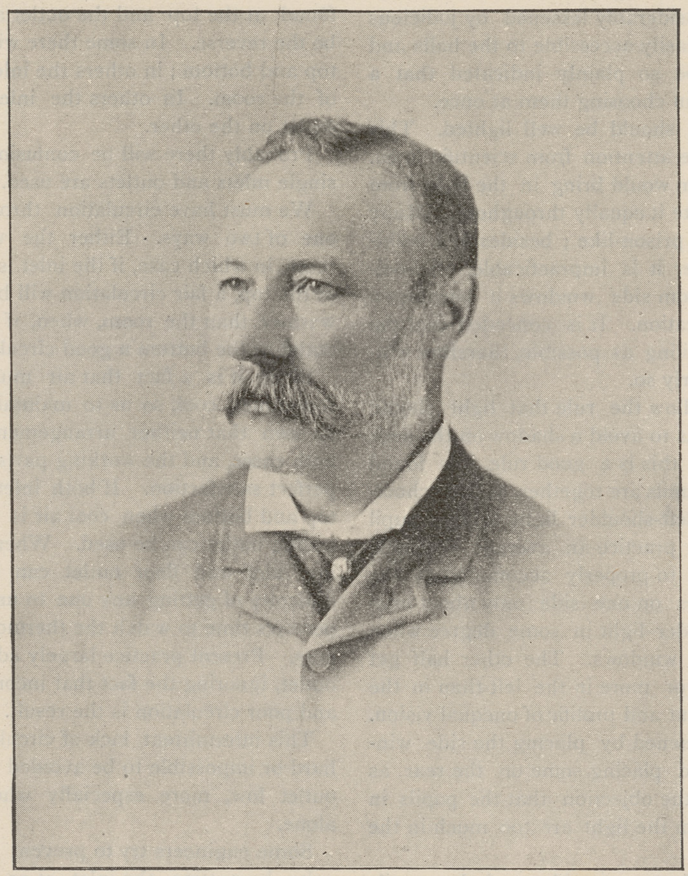
E. J. Lennox, Architect. | Holbrook & Mollington, Sculptors.

MONTREAL.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

Last month I quoted from a letter of Mr. L. J. A. Papineau, in which he expressed his regret that so little veneration is shown in this country for ancient buildings. That this disregard for ancient historic landmarks is not universal is however very clearly shown by the interest lately exhibited by all classes of our citizens in the preservation of the old Chateau de Ramezay on Notre Dame street opposite the City Hall. When it became known that it was the intention of the Quebec Government who were the owners of the property to offer it for sale at auction, the Numismatic and Antiquarian Society immediately set about means to prevent the sacrifice of the old building which is one of the few surviving links binding the early history of the city with the present. Meetings were held and resolutions passed asking the City Council to purchase the property with a view to the restoration of the building as a public library and historical museum. Several valuable gifts of books, historical pictures and other relics were promised in case the property was preserved. Petitions were also placed in circulation and signed by upwards of one thousand leading citizens praying the Council to purchase the property. As a result of the general interest thus manifested, the Council at a special meeting called to consider the subject, consented to the petition, and at the sale which took place on the 23rd of Oct., the Mayor on behalf of the eity purchased the historical Chateau for $27,000 and some of the adjoining lots for $18,506, while several members of the Autiquarian Society, with the object of preserving to the city the whole square, and preventing the appearance of the old Chateau from being spoiled by objectionable architecture, bought the corner with the three adjoining lots. The property thus purchased at a cost of $32,396 is now offered to the city at cost price.

A movement is on foot with the object of providing a residence in this city for the Governor-General, and the Council are to be asked to consider an offer of Mr. Duncan McIntyre's mansion on Drummond street at the price of $300,000 for this purpose. In view of the enormous expenditures for public improvements in this city of late, and the heavy interest charges which in consequence must be borne, the wisdom of a large outlay for this purpose may very properly be questioned. In connection with Mr. McIntyre's house an interesting suit is now pending in the courts. The widow of the late W. T. Thomas, who was the architect of the building, has brought action against Mr. McIntyre to recover some $35,000, alleged to have been earned by her husband in connection with the erection of the building. The larger portion of the sum mentioned represented 10 per cent. commission on the alleged cost of the house. The owner of the house denies that he agreed to pay a commission on the cost. The court upholds him in his refusal to state what the cost was. The matter has not yet reached decision.



J. NELSON, A.R.C.A.,
President Province of Quebec Association of Architects.

The right of the proprietor of a building which is under lease to make changes therein is involved in a suit brought against the Royal Insurance Co. of this city by a firm of advocates occupying offices in their building. Plaintiffs claim that damage was caused to their practice by the changing of the motor power of an elevator, which was hydraulic, to electric power. Defendants contended that a proprietor has a right to make changes in the premises occupied by the tenant, provided due diligence be exercised. Plaintiffs argued that due diligence was not used, and that in any case the proprietor cannot make alterations or changes in the premises. The case is yet undecided.

The Royal Victoria hospital is shortly to be opened by Lord and Lady Aberdeen. A description of the building has already appeared in the CANADIAN ARCHITECT AND BUILDER.

I have much pleasure in forwarding to you for reproduction in the ARCHITECT AND BUILDER a portrait of Mr. J. Nelson, AR.C.A., the newly elected President of the Quebec Association of Architects, Mr. Nelson has been a modest, though valued worker in the interest of the Association since its [illegible]tion, and the honor which has been conferred upon him could cer[illegible]t have been more worthily bestowed.

[illegible] Victoria railway bridge over the St. Lawrence at Montreal contains [illegible]oo cubic feet of masonry work and 10,500 tons of iron.

LONDON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The building season of 1893, owing to the exceptionally fine weather with which we have been favored, will be longer than usual. In this city at least the season which is about to close has been the most active in building enterprise experienced for a number of years. So far as I can learn none of the local architects have had occasion to complain of lack of work, while some have found it necessary to trespass on the hours which ordinarily are devoted to other purposes.

In many of the new buildings erected of late there is pleasingly manifest a striving on the part of our architects after the artistic and aesthetic in the treatment of their designs, a disposition to depart from old time sterotyped ideas, which is deserving of commendation. In most instances the efforts made in this direction have had a beneficial effect upon the architecture of the city.

HAMILTON.

(Correspondence of the CANADIAN ARCHITECT AND BUILDER.)

The past season is declared by local architects to have been one of the most active in building enterprises experienced here for several years, and there are a number of new buildings projected which it is believed will make the season of 1894 a busy one also.

Some expensive residences are at present in course of erection. Among these are the residences of Mr. George T. Tuckett and Mr. C. M. Counsell, both designed by Mr. James Balfour, architect, of this city. Mr. Tuckett's residence is nearing completion, and will be occupied by the owner in a few weeks. It ranks among the most expensive residences of the city, and is certainly one of the most modern in its interior arrangements. It occupies a site on rising ground, and affords a pleasing view of the Bay and Burlington Beach in the distance. The building throughout is constructed in the best possible manner, and with the best materials. There is no attempt at elaborate ornamentation, but utility, comfort and good taste, are everywhere apparent. The joinery work, which is being done by Messrs. Jos. Hoodless & Son, is deserving of all praise. For interior finishing, oak, bird's eye maple and mahogany, are principally employed. The brick and stone work was done by Mr. Geo. Webb; the plumbing by Messrs. Fairley & Stewart. The heating will be done by two Daisy boilers of the largest size, arranged so that one or both may be in operation as may be required. The drawing room will be decorated in white enamel with white silk panels, the mantel of white onyx. The ceiling will be decorated in keeping with the rest of the room by Messrs. Elliott & Son, of Toronto.

Mr. Counsell's house, although much less expensive, occupies a pleasing location at the corner of James and Markland streets, and exhibits many original and pleasing features of design. The lower story is constructed of stone and the upper stories of brick and wood. The stone was obtained from a local quarry, and is of good quality but very hard, and so brittle that it is apt to split under the workman's chisel. Often a block will give way just when the work upon it is about finished, thus proving an expensive loss. To such an extent has this occurred that the contractors' profits are not likely to be very substantial. The house is roomy, carefully planned, and excellently lighted, and will no doubt afford every comfort to its owner.

On October 23rd, at the Church of Our Lady of the Holy Rosary, Thorold, Mr. James Battle, cement manufacturer, was united in marriage to Miss Mary Conlon.

At Ingersoll, Ont., a company has been formed and acquired the Canadian business of the Guelick Silica Barytic Co. of Detroit. Mr. Walter Mills, who was manager of the Canadian business of the Detroit Co., will continue with the concern.

An anonymous correspondent of the Orillia *Times* recently declared that "local contractors hesitate to submit tenders for work designed by Mr. W. H. Crocker, architect, of that town, being doubtful whether honest competition would prevail." Mr. Crocker, through his solicitor, has demanded a retraction over the signature of the writer. It is to be hoped that the person who would make such a serious imputation under cover of an assumed name, may be compelled to disclose his identity.

AMERICAN SCHOOL BUILDINGS.*

As to the requirements of a sanitary school building and one best suited to the needs of children, say a common school of twenty rooms: First, it should be as nearly fire-proof as practicable. Children do not have the strength and experience of adults and cannot look out for themselves. If it cannot be fire-proof reduce the fire risk as much as possible. Wooden partitions, though often used, should be avoided. If outer walls are furred, it should be done with fireproof furring. Stairs should be enclosed in brick shafts, and the stairs themselves made of solid material, preferably of hard wood for both risers and treads, with fireproof or slow-burning construction underneath them. If floors are of wood on wooden joists, as they generally must be, the spaces between the joists should be cut off with solid plank in addition to the usual bridging. On no account should the floors be raised from the joists for the purpose of circulating air underneath unless all parts are fire proof. Floors should be of good smooth hard wood, closely laid on an under floor, and deadened with mineral wool or something as good. Joists should not run through from wall to wall, and should be so placed as to drop out without tearing the wall in case of fire. The danger from fire can be considerably lessened by judicious planning, so that all rooms are easily accessible to the halls and the stairs. All exits should be so plainly indicated that a stranger would have no trouble in choosing them at once.

The sanitary school building should be well lighted. This matter has received considerable attention from scientific men. It is claimed that an ideal system would bring in the light from the top of the room and distribute it equally throughout. Many object to this because it appears prison-like; besides in a building with one room over another it is impracticable. Schoolrooms being generally lighted from side windows it becomes a question as to number and location. It is conceded that the light should enter as near the ceiling as possible, therefore windows reach to the ceiling or nearly so.

It has been customary to follow the rule that light should come over the left shoulder, so as to avoid a shadow on the desk from the right hand; but while this is a good rule it is found hard to apply it where several pupils are together, as in a schoolroom, since that which will be left-shoulder light for one pupil will not be for some other. In practice an average is struck, and the windows so placed as to properly accommodate the greatest number. With windows on one side only about one-half the pupils get the left-shoulder light in some degree when they sit with the left side to the windows. The other half get the light chiefly in the left eye, or more in the left than in the right. That is a bad arrangement and prolific of unequal vision. This can in some degree be lessened by placing the side windows well towards the rear, and placing some on the rear as well. There is then, however, the objection that the pupils in the diagonal corner furthest from the light are too much in the dark.

In a room lighted wholly from one side and the pupils placed with back to the light some curious facts are noticeable. First, the same number of pupils receive left-shoulder light, as in the former case—that is, one-half; the other half receives the light over the right shoulder, not a desirable thing and not to be tolerated unless there is enough reflected light to dissipate the shadow cast by the right hand on the desk. If there can be such reflected light, and there is no doubt about that, it gives the best light I know of for so many pupils, since as many get left-shoulder light as in the other way, and none of them get it partly in front. That this is the best arrangement for pupils I think there can be no question, though upon the teacher it is especially hard, though it may be said that the teacher can always move about, while the pupils must stay where they are.

I think it is common to put some windows on the side and some on the end of each room, where it can be done, though I am inclined to think the side light the better, if it could be properly curtained and managed by the teacher. Whatever the position of windows there should be plenty of them.

The sanitary school building must be well heated and ventilated. These two things can be considered together, though heating alone used to be the first and only consideration. The requirements call for the right amount of fresh air and heat, properly introduced to the rooms and circulated therein. Economy seems to call for a central plant for the supply. One of the main difficulties to overcome after a good heating device has been provided is the proper inlet, exit and circulation of the ventilating air in the schoolroom. Unless this work is properly done the whole plant is a failure, and it is a fact that much confusion exists as to the method to be employed. The problem is made more difficult of solution because the atmospheric changes are so rapid and radical that no single arrangement of the working parts will answer for any certain time. Obviously the best way to have the air enter a schoolroom would be at openings all over the floor, and it should leave at a like number of openings in the ceiling. That way is not practicable where rooms are over one another, and therefore the common way of introducing air into the room is by single and ample opening. It is let out by another. Where these inlets and outlets shall be placed with reference to each other and the room itself is a question in dispute. Much confusion obtains on this point—perhaps because people believe it is possible to adjust the openings to suit all occasions. The question will be much nearer solution when this belief is eradicated. In some rooms the inlet will be found at the top and the outlet at the bottom; in others it will be the reverse. In some there will be inlets and outlets at both top and bottom; in others the inlet and outlet on the same side of the room. In others the inlet will be on one side and the outlet on the other.

Probably there will be confusion on this point so long as the single inlets and outlets are used.

We must have circulation through the room and we get it in one of two ways. Either the air may enter cooler than the room, in which case, if the inlet is at the bottom and the outlet at the top, a fair circulation will be given; or the air may enter warmer than the room, when, if the inlet is at the top and the outlet at the bottom a good circulation will be got.

Since it is a fact that air must sometimes enter warm and sometimes cool, so as to maintain the standard of heat, it will be seen that neither arrangement of openings will answer for both cases, and the working parts cannot be so fixed as to give perfect satisfaction. If both inlets and outlets are provided at top and bottom when cool air is wanted, the floor inlet and the ceiling outlet can be used. When warm air is wanted the ceiling inlet and floor outlet can be used. But aside from the difficulty of getting any one to understand it, it would take one person's time to watch the thermometers and manage the dampers. Present practice largely adopts the ceiling inlet and floor outlet, ignoring the fact that incoming cool air falls to the floor, and poor circulation is the result.

This intermittent lack of circulation is a grave difficulty and hard or impossible to be avoided when the inlet is high and the outlet low, more especially when a room is heated by air alone.

Some engineers try to prevent notice being taken of the difficulty by putting the inlet at or near the floor. When the air comes in warm it rises to the ceiling, distributes, cools and falls to the floor, leaving at the foul-air opening. Under these conditions the air appears to circulate properly, the only objection being a current of hot air striking the pupils. The current of air is made less noticeable by a screen; that is, of course, unnecessary when the inlet is above. On the other hand, with inlet at the floor and the air coming in cool, there is and can be little or no circulation through the room, the air simply entering, flowing along the floor, and leaving at the outlet. This seems to be a case of out of sight and notice, out of mind. The lack of ventilation is not easily discovered, and thus gives a fine chance for the professional quack to show off his system of ventilation, for with his air meter at the inlet and outlet he finds the full volume of air passing that he guaranteed to furnish, and no one stops to inquire whether that air gets to the proper parts of the room by circulation.

I believe it would be a good system to heat the floors evenly and always bring the air in cool, provided that the floor heat could be controlled and unpleasant draughts prevented.

It is hard to say where the inlets and outlets should be placed to satisfy all conditions, but I have advocated putting the high and the outlet low, though I am quite ready to should a better way be found.

The general plant that is to furnish the heat and venti

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* Abstract of paper read by Walter S. Pardee at the annual convention of Building Inspectors and Commissioners at St. Louis.

in a sanitary school building must be ample to do its work. It must be durable, cheap to put in, and cheap to maintain. Furnaces furnishing hot air, steam plants and hot water plants, with numerous modifications and partial unions, are the principal kinds used in school buildings. For years the furnace did good duty, and it still holds its place, at least in the smaller class of buildings. Its first office was probably that of heating, though it was made so that it had to furnish ventilation in order to heat. When steam first came into u e its work was entirely that of heating, and for a time schools heated by steam were a long way behind those heated by furnaces. Necessity soon compelled the use of indirect radiators to heat air for ventilation. This system had quite a run, and is still used, though it gradually loses favor as better methods come up.

The marked advance in ventilation during the last few years has been the adoption of a fan or fans run by power for sending the air to the rooms. In furnace-heated buildings the only methods of creating suitable currents was by heat and in order to induce currents in the foul air shaft it was connected with the smoke-stack the heat of which caused the current. In steam-buildings coils were used in addition to the smoke stack. It has recently been discovered, however, that the heat used to create currents, in the foul-air shaft would be of more service in running a fan to do the same work. Hence fans are in common use. There is a difference of opinion whether one fan or two shall be used. I am of the opinion that with our ordinary leaky rooms two do the work better than one, though there is room for argument on that point.

From the old form of steam plant have sprung many modifications. There is one that heats entirely by steam coils placed in a fresh-air room in the basement, the air being blown to the rooms by a fan. At present I favour the adoption of a central steam plant, running direct radiators to the rooms, an indirect set of radiators to heat the fresh air, a fan to blow it into the rooms and an exhaust fan to take it out. In a cold climate it works well; in fact, I do not see how it would be possible to get so good results from any other method. In warmer places than Minnesota I suppose the hot air system would be sufficient.

This steam system has its faults and can be much improved, especially as regards details of arrangement. While being somewhat more costly to put in than the indirect method, it makes a very low record for fuel, a good point in any plant. Contrary to expectation, it has been found cheaper to run and fully ventilate than to run the old steam plant without ventilation. It was said when fans came into use and talk of 1,200 cubic feet of fresh air per hour per pupil was made, that it might be very well and quite necessary that we have this fan ventilation, no matter what it cost for fuel. That the fuel bill would be increased no one doubted; nevertheless, it has decreased, and this fact should be a strong argument for its adoption over the country.

The sanitary school building should properly dispose of its waste. I declare for first-class plumbing, without hesitation, where sewerage connection can be had. Where it cannot be had and cesspools are impracticable, I am not so certain what to say. There is a choice between dry closets, crematories and out-of-door privies. As to plumbing, it has been often and justly condemned. It has been the cause of much sickness and death. Whatever it has been, the day has come when a plumbing job can be made practically perfect so that it can be fully recommended for any kind of building. In our modern school building nothing can be better than our best known water-closets, with slate or glass urinals.

However, there are schools where plumbing cannot well be had. There seems to be demand that all toilet rooms shall be inside the building. This demand I believe to be just, provided the inside toilet room can be made quite sanitary; the demand ought to be complied with. But here is the difficulty. The problem seems nearer solution than it did years ago, but there has been great injustice done in the attempt to get a safe device. The principle of the dry closet and crematory is either to dry or burn the sewage. There has been a dry closet in use more or less where the privy vaults were in the basement but wholly unconnected with any other part of the building. This seems to have met with fair success, at least in that it does not admit odors to the schoolrooms, but it costs a large amount for fuel and has no great run.

There is another dry closet in which the privy vaults are connected with the schoolrooms by means of hollow wooden floors and partitions, though sometimes this connection is made through direct ducts. This bold step was evidently taken to save fuel, and though the whole device was carefully arranged and it possesses many taking points, I believe it is inevitably doomed to condemnation as an unsanitary device. No privy vaults connected directly or indirectly with the schoolrooms ought to be upheld for a moment, for although the draught may be made to go the right way some of the time, it will occasionally back up from the privies into the rooms, and no such thing should be tolerated. If outside privies could not be used it would be better for a scavenger to stand at the basement door with a cart and remove the contents of vaults daily or hourly, than for the public to tolerate such a thing. Happily there is a strong sentiment against this device, and attention is being wisely turned to more sanitary contrivances.

Along this line it may be well to say that the recent crematory closet seems to be somewhat in advance of the old dry closet. It has at least the merit of not being connected with the rooms, so what odor there is, not going up the stack provided for it, is not likely to get into the rooms. I have not seen the crematory closet tried, but it seems to promise well. The only difficulty I can foresee is the disposal of the urine, which will accumulate in unpleasant quantities unless the greatest care is taken.

COMBINATION LEAD AND FELT ROOFS.

A novel style of roof combination which is likely to prove more or less interesting to American readers, has been brought to the attention of the foreign world by an invention of Herr Siebel of Dusseldorf, the history of which is decidedly entertaining. The inventor was well aware no doubt that the best protection against dampness arising from the ground into walls is a sheet of lead, and that on account of the great expense of a protection of this kind of sufficient thickness to support the weight of superstructure without tearing, it is common in these days to substitute a sheet of tarred felt. Bearing these things in mind he conceived the idea that both materials might be employed to advantage by inclosing a thin sheet of lead between two thicknesses of tarred leather.

In this way the metal, although thin, acts as an impenetrable barrier to dampness and is not liable, as is the case with felt when used alone, to gradual decay. While engaged in perfecting his invention it occurred to Herr Siebel that the felted lead would make an impervious roof covering, and perhaps a durable one, and thorough tests seem to confirm this idea. The felted lead is solid in the same form as ordinary roofing felt, and applied in the same manner, receiving the usual protecting coating of tar and gravel on top; but the metal protects the felt under it so completely from the evaporation of the volatile portions of the tar, which is the principal cause of the deterioration of composition roofs, that it is said to remain tight for an indefinite period. Even when the lead is exposed, from the decay of the felt over it, nothing is necessary but to lay over it new felt, with tar and gravel finish, to make the roof as good as ever, while an ordinary felt roof which has once begun to rot is not usually worth repairing. The practical man will think of other details, such as the facility with which flashings, gutters and zinc or copper edgings can be soldered to the lead of the roofing, which seems very much in favor of the new material. It is, however, difficult to rool very thin lead, and it is hard to understand how sheets enclosed in felt could be sold for roofing at a price to compete with a tin roof, which would be better in most respects.

PERSONAL.

We regret to learn that on the 21st of October the residence and office of Mr. James A. Macdonald, architect, Regina, N. W. T., with their entire contents, were destroyed by fire. Mr. Macdonald's instruments, papers, and library were among the articles destroyed.

TRADE NOTES.

Sheathing "Quilt" is the name of an article recently patented by Samuel Cabot, of Boston. It is intended to take the place of back plastering and other expensive methods now in use for deadening sound and making dwellings and other buildings temperature proof. It owes its name to the fact that it is made of a tough saline grass held in place between two layers of manilla paper by quilting. Its great elasticity makes it a remarkable sound deadener, and its use in this way is quite as great an economy as in any other.

A TABLE FOR TREADS AND RISERS.

FROM *The California Architect* we republish the following table, which will be found very useful to many of our readers. The spacing of the lines of figures into groups aids the eye in following the direction to the final point.

DIRECTIONS.—In the column beginning with the rise of step desired, find the height of story from top of floor to top of floor, then follow this line to the column under "Risers," which gives the number of risers. In the column under "Treads" find the number of risers *less one*, and on this line under the column of width of tread will be the length of run.

Risers	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	inches	Treads
No. 1	0.6	0. 6¼	0. 6½	0. 6¾	0. 7	0. 7⅛	0. 7¼	0. 7⅜	0. 7½	0. 7⅝	0. 7¾	0. 7⅞	0. 8	0. 8¼	0. 8½	0.9	0. 9½	0.10	0.10½	0.11	0.13	0.14	1
2	1.0	1. 0½	1. 1	1. 1½	1. 2	1. 2¼	1. 2½	1. 2¾	1. 3	1. 3¼	1. 3½	1. 3¾	1. 4	1. 4½	1. 5	1.6	1. 7	1. 8	1. 9	1.10	2. 2	2. 4	2
3	1.6	1. 6¾	1. 7½	1. 8¼	1. 9	1. 9⅜	1. 9¾	1.10⅛	1.10½	1.10⅞	1.11¼	1.11⅝	2. 0	2. 0¾	2. 1½	2.3	2. 4½	2. 6	2. 7½	2. 9	3. 3	3. 6	3
4	2.0	2. 1	2. 2	2. 3	2. 4	2. 4½	2. 5	2. 5½	2. 6	2. 6½	2. 7	2. 7½	2. 8	2. 9	2.10	3.0	3. 2	3. 4	3. 6	3. 8	4. 4	4. 8	4
5	2.6	2. 7¼	2. 8½	2. 9¾	2.11	2.11⅝	3. 0¼	3. 0⅞	3. 1½	3. 2⅛	3. 2¾	3. 3⅜	3. 4	3. 5¼	3. 6½	3.9	3.11½	4. 2	4. 4½	4. 7	5. 5	5.10	5
6	3.0	3. 1½	3. 3	3. 4½	3. 6	3. 6¾	3. 7½	3. 8¼	3. 9	3. 9¾	3.10½	3.11¼	4. 0	4. 1½	4. 3	4.6	4. 9	5. 0	5. 3	5. 6	6. 6	7. 0	6
7	3.6	3. 7¾	3. 9½	3.11¼	4. 1	4. 1⅞	4. 2¾	4. 3⅝	4. 4½	4. 5⅜	4. 6¼	4. 7⅛	4. 8	4. 9¾	4.11½	5.3	5. 6½	5.10	6. 1½	6. 5	7. 7	8. 2	7
8	4.0	4. 2	4. 4	4. 6	4. 8	4. 9	4.10	4.11	5. 0	5. 1	5. 2	5. 3	5. 4	5. 6	5. 8	6.0	6. 4	6. 8	7. 0	7. 4	8. 8	9. 4	8
9	4.6	4. 8¼	4.10½	5. 0¾	5. 3	5. 4⅛	5. 5¼	5. 6⅜	5. 7½	5. 8⅝	5. 9¾	5.10⅞	6. 0	6. 2¼	6. 4½	6.9	7. 1½	7. 6	7.10½	8. 3	9. 9	10. 6	9
10	5.0	5. 2½	5. 5	5. 7½	5.10	5.11¼	6. 0½	6. 1¾	6. 3	6. 4¼	6. 5½	6. 6¾	6. 8	6.10½	7. 1	7.6	7.11	8. 4	8. 9	9. 2	10 10	11. 8	10
11	5.6	5. 8¾	5.11½	6. 2¼	6. 5	6. 6⅜	6. 7¾	6. 9⅛	6.10½	6.11⅞	7. 1¼	7. 2⅝	7. 4	7. 6¾	7. 9½	8.3	8. 8½	9. 2	9. 7½	10. 1	11.11	12.10	11
12	6.0	6. 3	6. 6	6. 9	7. 0	7. 1½	7. 3	7. 4½	7. 6	7. 7½	7. 9	7.10½	8. 0	8. 3	8. 6	9.0	9. 6	10. 0	10. 6	11. 0	13. 0	14. 0	12
13	6.6	6. 9¼	7. 0½	7. 3¾	7. 7	7. 8⅝	7.10¼	7.11⅞	8. 1½	8. 3⅛	8. 4¾	8. 6⅜	8. 8	8.11¼	9. 2½	9.9	10. 3½	10.10	11. 4½	11.11	14. 1	15. 2	13
14	7.0	7. 3½	7. 7	7.10½	8. 2	8. 3¾	8. 5½	8. 7¼	8. 9	8.10¾	9. 0½	9. 2¼	9. 4	9. 7½	9.11	10.6	11. 1	11. 8	12. 3	12.10	15. 2	16. 4	14
15	7.6	7. 9¾	8. 1½	8. 5¼	8. 9	8.10⅞	9. 0¾	9. 2⅝	9. 4½	9. 6⅜	9. 8¼	9.10⅛	10. 0	10. 3¾	10. 7½	11.3	11.10½	12. 6	13. 1½	13. 9	16. 3	17. 6	15
16	8.0	8. 4	8. 8	9. 0	9. 4	9. 6	9. 8	9.10	10. 0	10. 2	10. 4	10. 6	10. 8	11. 0	11. 4	12.0	12. 8	13. 4	14. 0	14. 8	17. 4	18. 8	16
17	8.6	8.10¼	9. 2½	9. 6¾	9 11	10. 1⅛	10. 3¼	10. 5⅜	10. 7½	10. 9⅝	10.11¾	11. 1⅞	11. 4	11. 8¼	12. 0½	12.9	13. 5½	14. 2	14.10½	15. 7	18. 5	19.10	17
18	9.0	9. 4½	9. 9	10. 1½	10. 6	10. 8¼	10.10½	11. 0¾	11. 3	11. 5¼	11. 7½	11. 9¾	12. 0	12. 4½	12. 9	13.6	14. 3	15. 0	15. 9	16. 6	19. 6	21. 0	18
19	9.5	9.10¾	10. 3½	10. 8¼	11. 1	11. 3⅜	11. 5¾	11. 8⅛	11.10½	12. 0⅞	12. 3¼	12. 5⅝	12. 8	13. 0¾	13. 5½	14.3	15. 0½	15.10	16. 7½	17. 5	20. 7	22 2	19
20	10.0	10. 5	10.10	11. 3	11. 8	11.10½	12. 1	12. 3½	12. 6	12. 8½	12.11	13. 1½	13. 4	13. 9	14. 2	15.0	15.10	16. 8	17. 6	18. 4	21. 8	23. 4	20
21	10.6	10.11¼	11. 4½	11. 9¾	12. 3	12. 5⅝	12. 8¼	12.10⅞	13. 1½	13. 4⅛	13. 6¾	13. 9⅜	14. 0	14. 5¼	14.10½	15.9	16. 7½	17. 6	18. 4½	19. 3	22 9	24. 6	21
22	11.0	11. 5½	11.11	12. 4½	12.10	13. 0¾	13. 3½	13. 6¼	13. 9	13.11¾	14. 2½	14. 5¼	14. 8	15. 1½	15. 7	16.6	17. 5	18. 4	19. 3	20. 2	23.10	25. 8	22
23	11.6	11.11¾	12. 5½	12.11¼	13. 5	13. 7⅞	13.10¾	14. 1⅝	14. 4½	14. 7⅜	14.10¼	15. 1⅛	15. 4	15. 9¾	16. 3½	17.3	18. 2½	19. 2	20. 1½	21. 1	24.11	26.10	23
24	12.0	12. 6	13. 0	13. 6	14. 0	14. 3	14. 6	14. 9	15. 0	15. 3	15. 6	15. 9	16. 0	16. 6	17. 0	18.0	19. 0	20. 0	21. 0	22. 0	26. 0	28. 0	24
25	12.6	13. 0¼	13. 6½	14. 0¾	14. 7	14.10⅛	15. 1¼	15. 4⅜	15. 7½	15.10⅝	16. 1¾	16. 4⅞	16. 8	17. 2¼	17. 8½	18.9	19. 9½	20.10	21.10½	22.11	27. 1	29. 2	25
26	13.0	13. 6½	14. 1	14. 7½	15. 2	15. 5¼	15. 8½	15.11¾	16. 3	16. 6¾	16. 9½	17. 0¾	17. 4	17.10½	18. 5	19.6	20. 7	21. 8	22. 9	23.10	28. 2	30. 4	26
27	13.6	14. 0¾	14. 7½	15. 2¼	15. 9	16. 0⅜	16. 3¾	16. 7⅛	16.10½	17. 1⅞	17. 5¼	17. 8⅝	18. 0	18. 6¾	19. 1½	20.3	21. 4½	22. 6	23. 7½	24. 9	29. 3	31. 6	27
28	14.0	14. 7	15. 2	15. 9	16. 4	16. 7½	16.11	17. 2½	17. 0.6	17. 9½	18. 1	18. 4½	18. 8	19. 3	19.10	21.0	22. 2	23 4	24. 6	25. 8	30. 4	32. 8	28

METHOD OF STORING MOULDINGS.

Mr. Owen B. Maginnis writes as follows on this subject in *The Woodworker*:—

Concerning the proper storing and safe keeping of strips and moldings, I think the most convenient way to place them for convenient use is that shown in Fig. 1. A rack or series of holes or spaces is made, by framing together a front out of 1¼-inch or 1½-inch stuff (pine is good enough) after the manner of Fig 1, which is shown to be 10 feet 6 inches high. The

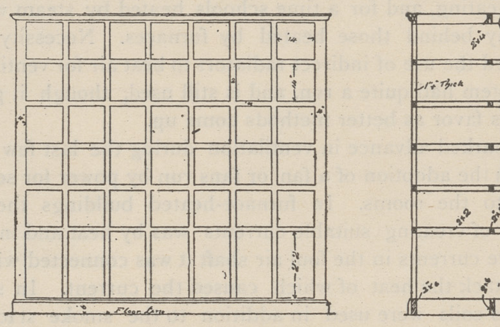

FIG. 1—A MOLDING RACK. SECTION.

bottom space is 2 feet two inches high and 14 inches wide. The case is ten feet wide, so that 7 spaces are obtained. The bottom spaces are made thus for the larger sizes of moldings or strips, so that they may contain more, and rest solidly and safely on the floor.

In every molding rack the heavy stuff should be stored below, and in order to get a larger quantity into a given space it will be necessary to make the space large.

The rack illustrated here contains 42 spaces for moldings of different sizes, and for convenience and readiness of handling the smallest moldings, as ⅝ and ¾, beads, quarter-rounds, cones, and such like, are placed in the upper spaces. The section drawn to the right will give the reader a fair idea of its construction. The sides can either be left bare or covered over with ⅞-inch matched stuff, and a crown mold broken round the top to give it a finish, as shown.

The practical mill man and wood worker will at once perceive the convenience of a storage rack like this, for the reason that 42 different sizes and designs of mouldings are a good many, but if more be carried in stock a larger rack with more spaces can be made, or another section added to the one already made. In addition to this, the quantities in stock can be quickly computed, especially if the rack be made a fixed length—say 11 or 15 feet; then 12 and 16 feet lengths can be stored in it and the accurate number of lineal feet arrived at by counting the ends in each space. I am a great stickler for order in a mill, and would

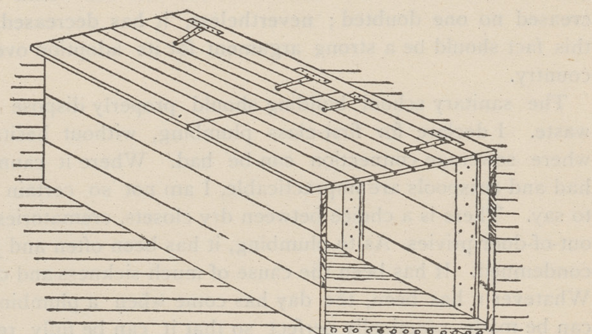

FIG. 2—A HOT-BOX.

therefore like to see one of these conveniences in every well-regulated one. Numbers can be affixed to the face of the frames for catalogueing and ordering. The dimensions of the various pieces I have marked on the sketch, so that anyone who wants to make a rack after this pattern can easily do so.

At Fig. 2 will be seen an is ometrical drawing of a hot box for heating stuff preparatory to glueing. The pieces can be handily placed in it, being laid on the strips on the bottom, which lie on the steam pipes underneath. The box can be constructed of ⅞ or one-inch matched or tongued and grooved boards, not wider than six inches, being held together by battens screwed on in the way shown in the interior. The lid is hinged by strong common T-hinges and may, for extra convenience, be in two halves or flaps, in order not to let the heat escape by exposing the entire inside of the box.

DECORATION AND FURNITURE

MANUFACTURED AND REAL ART.

We have heard a good deal about artistic craftmanship, as if it was our duty to invent certain trades for the benefit and pleasure of artists; without for one moment believing that art may be found in every trade, if it be only honestly exercised, and the materials honestly used. For at least 40 years we have been encouraging what we may term "manufactured art," or importing some foreign style; trying to make our furniture, our fabrics and textiles, our metal work, and other things "artistic," to impart to them certain plastic qualities of form and grace and of harmonious colour without seeing or even suspecting that all this effort is thrown away; that, in fact, we cannot force our "art" notions on things or on materials, but that whatever good or beauty and grace an article possesses must be a spontaneous growth out of the material and condition of workmanship. Cultivated people are beginning to turn with well merited disgust from so-called "revivals" and "art" furniture, "æsthetic" carpets and fabrics, "mediæval" brasswork "Queen Anne" or "Jacobean" sideboards and cabinets, chairs and tables, "Japanese" ware, "Empire" decorations, and a variety of other prefixed adjectives of this sort; they begin to see that there is nothing honest about a kind of manufacture which has no claims to be called either Queen Anne or Empire, or by any other title except that it has been made to imitate work of those periods—descriptive titles that have only a meaning in the catalogues of Wardour street or Tottenham Court road.

When will the people learn that we must clothe modern ideas in modern dress? When will they see the absurdity of slavishly imitating old furniture, woodwork, or copying old Persian tiles or the "Book of Kells" for needlework and embroidery? The same desire to make our new work like the old is observed in the copying of old plaster or stone relief in modern compositions for wall and ceilings, or oak carvings in materials which they have no affinity for, to sympathy with, whatever. We have nature open to us as well as the ancients had; we have our own materials to work with, our own requirements, as well as they had. Why do we not make the same use of them as our ancestors? The question awaits an answer. Contrast for a moment the woodwork or furniture on the 16th or 17th centuries with a piece of vulgarised shop work. In the former we observe conversion of the material which was used with meaning and intention; the ornament was an interpretation of nature in sympathy with the material, whether wood or plaster. The workman *started* with an *idea*, instead of borrowing one from some ancient source; his *motif* was derived from his own conception. For practical examples of the contrast, let us compare the woodwork of some old hall in Cheshire or Warwickshire, or a 17th century cabinet at the South Kensington Museum, with a piece of modern workmanship of the Tottenham Court road class, and we at once perceive the differences. In the former there is no meaningless repetition in the modes of framing or ornamentation.

We must look to the practical working of the trades for improvement. If a material or a piece of workmanship is susceptible of art, it can only exhibit it by a close observance of its peculiarities, or by the method employed in converting it. Practical design as it is taught in our art schools consists merely in making designs on paper according to certain conditions, whereas it can only be developed by a close study of the material. Take, for instance, carpet design. The success of the pattern depends on the designer's knowledge of the fabric. How many tints must be used to produce a gradation of colour?—as every patch of colour pattern must be defined in the and be thought of like the tesseræ of a mosaic. It also depends on the number of colours, the "planting" or dividing the bands of colour or frames, to produce a given design, and the repeats. The designer may make a beautiful arrangement of pattern and colour; but if it does not fulfil the technical conditions it is useless. For these reasons it is better to encourage the working out of those designs which can be most naturally effected, to avoid any complicated and strained efforts, and mainly that the limitations or restrictions imposed by the fabric should be observed. These rules cannot be followed when an endeavor is made to produce anything novel or some new style for the market. There is a ceaseless demand made by some manufacturers for a new style or pattern, knowing the public craving for novelties. It goes on year by year. New carpet and wall-hangings designs; some new furniture or decoration "craze," like Japanese or bamboo; new fenders or fire-irons, stoves and overmantels are among the objects that have to be invented or designed to meet a fashion, and however exotic the taste or unappropriate the style, the order is obeyed. Of course, it goes by that elastic word of the manufacturer, "artistic," though its very nature is extremely inartistic—there is not the faintest indication that the so-called artistic qualities are an outcome of the workmanship or the material; rather they have been concealed or smothered with ornament or what passes for style. To take as an example the Louis XIV decorative furniture, known as Boule decoration. This kind of workmanship was carried to perfection by a few artists and craftsmen, of whom the leading one was André Charles Boule. It is a veneer or tortoiseshell and brass, with angle mounts, lines of mouldings, claws, feet, and other ornamentation; but the beauty of this kind of incrustation arose from the skill and taste of the art workmen engaged, and cannot be manufactured to order as many sorts of modern decoration are. Then there is no effort—no attempt to do something fresh for novelty's sake. The artistic furniture of France a hundred years ago, or the earlier schools of Italy and Flanders, was a branch of workmanship perfected by degrees; studios and workshops were formed of craftsmen who gave themselves up to the work. The art in the old cabinet and bureau was slowly and spontaneously developed. In point of time we had first the chest as a receptable for documents and articles; the fronts of these were panelled and carved; next the chest was placed on legs forming two stages, and we had the cabinet or sideboard. Besides being carved, the fronts have hinged flaps, and the interior is divided into drawers or recesses. The decoration grew as slowly; first carving, then ornamental hinges of metal next incrustation of precious woods, ivory, or metal, the supports ornamented with brass mounts. In this way the chest grew into the ornamental cabinet; each step suggested itself to the craftsmen in a natural way.

The art was then hereditary; the crafts or guilds were the guardians of traditional skill in their particular trades, thus insuring that truly honest, national character which distinguished all workmanship during the 16th and 17th centuries. This traditional skill is seen in the delicate mouldings and turnings, the quiet inlays of wood and ivory. The craftsman, who was a master of woodwork, went patiently but boldly to work, and was content with plainness until he could see a way to develop or ornament a feature. An authority on woodwork has said that the "best present day example of furniture is the deal table of the farmhouse or cottage," where modern vulgarisation has not entered. He is right, because it is a plain, straight-forward piece of framing, solid and well put together; to make it artistic is to give it pleasing proportions. If it is a parlour or sitting room table, the legs may be partly turned, with rails tenoned into them, and the edge of the table moulded. But to make it "artistic" according to the modern sense would be to make it as light in its framing as possible; to make the legs like turned brush-handles, or to stick on a few carved trusses under the top. In the framed carpenter's work of the 16th century we see means the most simple adopted—the construction and form and ornament, if any, appear to be the traditional method of the craft; but its very construction was pleasing, and at one with the ornament, which may be a simple incised ornament or geometrical device on the panel, and delicate members moulded and stopped on the rails and stiles.

What we have said about certain manufactured goods and furniture is equally true of the architectural crafts. There has been a great deal too much forcing, trying to produce ornament by extraneous means. All kinds of American and other inventions have been introduced to turn out ornamental woodwork; but it is not artistic, because it did not spring naturally from those simple conditions which lie at the foundation of all good architecture. For instance, the processes of producing ornament by embossing wood or of burning away certain portions are not those which now commend themselves to us. The chisel, moulding machine, and carver's tool, like the operation of framing, appeal to our reason as the natural processes of conversion. These processes admit only a certain kind of decoration, moulding the stiles and rails, and carving or incising the panels. Stone and brick and metal and plaster have each its own methods of conversion, its own modes of decoration, and if we try to invent any other the work at once loses the characteristic of being artistic. Between modern and ancient art, then, there is this difference—one is a meretricious, superadded quality, the manufacture of art; the latter a spontaneous development from material and skill.—*Building News.*

SANITATION · HEATING

DISCONNECTING PLUMBING FIXTURES.

Disconnecting house fixtures from the soil pipe is sometimes practiced with us with good effect, says the *National Builder*, and the principle may, we think, be extended with good results inside our houses. A recent adaption in the bathrooms of a block of flats consists in placing a small sink in the tiled floor, which in turn is laid on a span of plank like the "mill floors." Beneath the floor a "puro" tap is placed on the waste pipe of the little sink towards which the tile floor is slightly graded. The sink is so placed that the wastes of a porcelain lined iron bath and oval basin drip into it with the least possible length. These short wastes are of three-fourths inch nickeled pipes connected to the fixtures by simple means and simply movable. By this means only two holes are made in the floor for waste pipes, one for the closet and one for the sink. This little sink takes care of any overflow that may take place, and the wash of the floor as well. The basin, so apt to lose its seal by self-siphonage, is disconnected, and the usual cumbersome and expensive wastes of the bathtub are done away with. The small open waste pipes of the bath and basin have only small fouling surfaces, and these are easily scoured out by the rapid flow of the hot waste liquids. The number of soil pipe connections is lessened and the work generally simplified by the means taken to disconnect them. Practically the plea is that it is only a little evil, and by tolerating it things will look as much better. The sanitary engineer everywhere finds people objecting to good work because "it looks so." Show the architect or owner how some favorite trick of construction is dangerous to life and health and suggest that the work should not be concealed. The reply is "but it will look so to have it exposed." With a properly arranged bath and basin there is no difficulty in going through a tiled floor with a single opening in addition to that for the water closet.

"The number of soil pipe connections is lessened and the work generally simplified by the means taken to disconnect them." There is no possible excuse for having small fouling surfaces of this character. In the ordinary well constructed bathtub the trap is within the length of a union from the tub, and the distance inside of the bathtub from the surface of the seal scarcely exceeds three inches, and is sometimes less. In many of our best forms of basin the whole length of pipe from the seal up to the basin can be reached for cleaning. The idea that "hot waste liquids will clean out a pipe three-quarters of an inch in diameter" is a matter of faith rather than of works. Every architect should be firmly imbeud with the idea that the plumbing work is the most honorable of all that goes inside the house; there is no excuse for sacrificing it to any other requirement of construction or convenience. Its perfection is of a paramount importance.

It has been found by careful experiments that one square foot of wall space will transmit from 70 to 1.25 units of heat per hour for every degree difference in temperature between the inside and the outside, the difference being caused by the action of the wind. In order to ascertain the amount of heat that will be transmitted through one square foot of wall space it will be well to take the lowest probable outside temperature and the highest transmitting capacity of the wall. Then from the desired temperature of the room subtract the lowest probable outside temperature and multiply the remainder by 1.25. This will give the number of heat units transmitted by each square foot of wall space for the space of one hour, multiply that amount by the area of the wall exposed in square feet, and the result will be the total heat units for one hour.

To find the heating surface we proceed as follows:—From the temperature of the steam subtract the temperature of the room; square the difference and divide by 100, which will give the number of heat units for each square foot of heating surface. Divide that into the total heat units required, and the quotient will be the number of square feet of heating surface for that pressure of steam. A three foot length of one inch pipe equals one square foot of heating surface. When a whole building is to be calculated the roof must also be included. All steam pipes act as heating surface. The diameter of the main in inches should be one-tenth the square root of the heating surface in square feet. It is as well to use one inch pipes for heating with live steam. For heating with exhaust steam two inch pipes are preferable. Return pipes should never be less than three-fourths the size of the mains.

METHODS OF MAKING HARD BRICKS.

In the western parts of Monogolia there are such rapid alterations of tempreature that ordinary bricks and even the usual building stones disintegrate very rapidly. The inhabitants of that country have a process for making extremely hard bricks, sonorous, and having the appearance of trrchyte. The article by E. Blanc in *Dingler's Polytechnisches Journal*, describing the process, does not inform us as to the exact constitution of the clay. The brick kiln is in the shape of a vertical cylinder, surmounted by a dome. There is a rather wide dome, and during the first part of the process the hole is left open. Three draught chimneys built inside the furnace open outwards at the height of the dome and are kept closed with clay at the beginning of the operation. The kiln is heated for three days during the first part of the process, and then the hole at the center of the dome is gradually reduced in size, by means of blocks of moistened clay. The flame is allowed to die down and the small hole remaining covered with wet felt. The felt is covered with sand which is continually kept moist. The three lateral chimneys are then opened and the fire lighted again. The draught is thus reversed and the second stage of the process thus commenced lasts for four days. During this time the water from the felt is heated and fills the kiln with an atmosphere of superheated steam. At the beginning of the second part of the process the bricks have light red color and this changes to uniform dark gray. At the end of four days the bricks are completed.

PUBLICATIONS.

A feature of the *Cosmopolitan Magazine* for November is the portion of the magazine given up to color work, no less than ten superb color illustrations being presented for the first time in magazine history, accompanying an article by Mrs. Roger A. Pryor on Changes in Women's Costumes.

The By-Laws of the Toronto Builders' Exchange have been neatly printed in book form and enclosed in flexible cloth covers, with the name of the Exchange in gilt thereon. In addition to the By-laws the book contains a copy of the Declaration of Incorporation, and a list of the members of the Exchange. We are endebted for a copy to the Secretary.

Mr. H. E. Haferkorn, of Milwaukee, has just published a handy list of books on Fine Arts and Architecture, Painting Sculpture, Decoration, Ornament, Carpentry, Building, Art Industries, etc. This work is an alphabetical reference catalogue, arranged under authors and subjects, and including analytical references to the contents of important works and as such, furnishes in compact form a key to all the literature of value on the subjects named, and is calculated to save the seeker after information a great deal of time which without its aid must be spent in searching through numerous catalogues. The price of this handy list in paper covers, is $3.25; cloth, $3.50; leather, $3.80.

USEFUL HINTS.

CEMENT FOR GLAZED SURFACE.—This cement was invented by Prof. Alexander Winchell, the noted geologist. It adheres perfectly to glazed surfaces, and is excellent for mending broken minerals or fossils. Pulverize two ounces of gum arabic and dissolve it in the quantity of water a laundress would use for the same bulk of starch. Dissolve half an ounce of fine starch and half a ounce of white sugar in the gum solution; cook the mixture in a vessel set in boiling water till it becomes clear. A little gum camphor, oil of cloves or sassafras, will keet it sweet. A little alum adds to the effectiveness and helps preserve the cement.

MAKING BRICK IMPERVIOUS TO MOISTURE.—In reply to "H. G. G.," Galt, Ont, who asks, is there any cheap and reliable way to make bricks water-proof, so that they will be able to resist a water pressure of say 75 to 100 pounds? the *Manufacturer and Builder* says:—The only safe course to pursue in a case like this, would be, in our judgment, to saturate the bricks before laying up, by immersing them in hot asphalt (or a composition containing asphalt), and to bed them in the same material, so that joints as well as bricks would practically form a single homogeneous body of asphalt. Such a wall would, if laid with care, be perfectly impenetrable to the entrance or exit of water. It would not be a cheap way of doing work, but would be efficient in fully answering this inquirer's purpose. A cemented wall would not be water-proof, and especially not where it was required to withstand considerable pressure.

THE T GIRDERS USED BY THE ROMANS.—In discussing the use of iron on a large scale by the Romans, Mr. Gradner writes:—"From Pompeii we might infer the total absence of constructive ironwork in Roman architecture, yet Prof. Aitchison claims that in the Baths of Caracalla large ceiling was supported on iron girders." This fact might be stated less doubtfully than these words would imply, since some tons of broken iron T girders were found a few years ago during the excavation of the great cella soliaris of the Therma of Caracalla. These girders had been cased in bronze, and they were arranged so as to form square panels, which were well filled in with concrete decorated with mosaic and delicate stucco reliefs, all colored and gilt, thus forming a strong and richly-decorated flat ceiling, with a span of enormous width.

The effect produced on the character of cement for mortars by the size or form of the sand employed has been the subject of investigation by M. Feret, a French expert, who prepared artificial sand out of crushed quartzite, with a view to determine its strength as compared with sand of natural formation. The sand as received from the crusher was graded into three degrees of fineness. The first consisted of such grains as would pass through a sieve containing four meshes to the square centimètre, and were retained on a sieve of thirty-six meshes per square centimètre; the second consisted of grains passing through a sieve of thirty-six meshes to the square centimétre, and retained in one of a much finer mesh, while the third consisted of the grains passing this last sieve. Measured dry, each of these samples had practically the same specified weight, the second being slightly the lightest. Mixed in various proportions, it has found that the mixture having the highest specific weight was one comprising six parts of the first sand and four of the third, the weight of this being thirty per cent. more than that of number two.